

REMARKS

Claims 1 and 46 are being amended to recite that the process is carried out in a reactor having two or more stages. This amendment introduces no new matter, and is supported in the specification as filed, *inter alia*, on page 4, lines 10-11 and lines 20-21. This amendment is being made for clarification only.

Claims 47-95 are being added. These new claims introduce no new matter. Claims 47-78 are supported in the application as filed, *inter alia*, in the original claims. Claims 79-82 are supported in the specification as filed, *inter alia*, from page 13, line 30 through page 14, line 6. The new claims are being added to more particularly point out and distinctly claim certain embodiments of the present invention. Applicants submit that the new claims are allowable over the cited references.

Claims 83-95 are supported in the specification as filed, *inter alia*, on page 3, lines 17-22. Applicants submit that claims 83-95 are patentable over the cited references. In particular, claims 83-88 are patentable over Mason et al., U.S. Patent No. 3,326,985, *inter alia*, because Mason discloses carrying out a polycondensation reaction at standard pressure and then vacuum stripping. That is, according to the present invention, 1,3 propanediol and/or oligomers or prepolymers of 1,3-propanediol having a degree of polymerization (DP) of 2-9 is polymerized to form polytrimethylene ether glycol at less than one atmosphere pressure. This process provides a higher yield than the process described in Mason. Mason discloses a process comprising forming a polytrimethylene ether glycol having an average molecular weight of 900 and then vacuum stripping the polytrimethylene ether glycol. As discussed further hereinbelow, Mason does not teach or suggest the presently claimed process or resultant products. The claims are also patentable over Sunkara, U.S. Patent No. 6,235,948, which does not disclose polymerization at reduced pressure. Accordingly, Applicants submit that claims 83-95 are allowable.

REJECTIONS UNDER 35 U.S.C. § 103

Claims 1 and 20-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Mason et al., U.S. Patent No. 3,326,985 (hereinafter "Mason"), in view of Kilpatrick, U.S. Patent No. 3,526,484 ("hereinafter "Kilpatrick"). The Examiner stated that Mason differs from the instant claims in that the process of Mason differs from the instant claims in that Mason discloses a batch process

whereas the present claims are directed to a continuous process, and that Mason differs from the instant claims in that Mason fails to teach more than one reaction stage.

Regarding the recitation in the present claims of a “continuous process”, the Examiner stated that it is “well established that batch and continuous claims are not patentably distinct”. Applicants submit that the case relied upon by the Examiner for the stated principle concerned a claim directed to a process wherein foam was introduced into a slurry, and that the claimed process differed from the prior art only in that the foam was to be introduced continuously. Applicants further respectfully submit that the “difference between continuous and batch processes is merely one difference to consider in determining whether the claimed invention would have been nonobvious.” *J.P. STEVENS & CO., INC. v. LEX TEX LTD., INC.*, 747 F.2d 1553, 1563 (Fed. Cir. 1984). Although the present claims recite “a continuous process”, the distinctions of the present process from that disclosed by Mason do not lie merely in the preamble of claims 1 and 46, but are set forth in the steps recited in the claims. Mason discloses a process where low molecular weight species (e.g., unreacted 1,3-propanediol, dimmers and trimers) are removed by vacuum stripping. Thus, Mason is simply removing lower molecular weight species to get a higher average molecular weight of the polyol. The vacuum stripping step of Mason is not a polycondensing reaction. The Examiner is directed to column 2, line 2, of Mason wherein the vacuum stripping procedure is described as an “after treatment.” Mason fails to disclose or suggest the process steps as recited in present claim 1. There is no continuous provision of 1,3-propanediol, and not even a suggestion to use a reactor having two or more stages.

In combining the disclosures of Mason with those of Kilpatrick, the Examiner apparently relies on the disclosure in Kilpatrick at column 1, lines 46-51, that the “process is usually carried out in two or more stages with intermediate formation of a low molecular weight, low viscosity polymeric liquid which is then passed through vessels maintained at proper temperatures and low partial pressures” (emphasis added) to support the assertion that Kilpatrick discloses a reaction carried out in two reaction stages. Applicants respectfully submit that the Examiner is misreading the disclosure of Kilpatrick, or improperly applying it to the present claims. Applicants submit that the term “stages” as used in Kilpatrick has a different meaning than the term as used in the present claims. Applicants have

amended claim 1 to clarify that the present process is carried out in a reactor having two or more stages, to clearly point out that the process is not merely carried out in two polymerization stages as disclosed by Kilpatrick. Applicants submit that Kilpatrick does not disclose or suggest a polymerization process carried out in a reactor having two or more stages.

Claims 1 and 20-24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Morris et al., U.S. Patent No. 2,520,733 (hereinafter "Morris"). The Examiner states that Morris differs from the present claims in that Morris discloses a batch process, whereas the present claims are directed to a continuous process, and Morris fails to disclose the use of two or more stages. Applicants' remarks hereinabove with regard to the disclosure of Mason and the combination thereof with Kilpatrick are incorporated herein. Morris discloses a process that includes heating trimethylene glycol and/or certain derivatives thereof in the presence of dehydration catalysts. Morris discloses that the process can be carried out in liquid, solution, emulsion or gaseous phases. However, Morris lacks any disclosure or suggestion of a polymerization process carried out in a reactor having two or more stages. Applicants submit that neither Morris nor Kilpatrick, alone or in combination, disclose, teach, or suggest the presently claimed invention.

Claims 1 and 20-24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sunkara et al., U.S. Patent No. 6,235,948 (hereinafter "Sunkara") in view of Kilpatrick. The Examiner states that Sunkara differs from the present claims in that Sunkara discloses a batch process, whereas the present claims are directed to a continuous process, and Sunkara fails to disclose the use of two or more stages. Applicants' remarks hereinabove with regard to the disclosure of Mason and the combination thereof with Kilpatrick are incorporated herein. Sunkara discloses a process for removing impurities from 1,3-propanediol, so that the 1,3-propanediol can be used in subsequent polymerization. Applicants submit that because Sunkara is directed to purification of a monomer to be used in polymerization, the combination thereof with Kilpatrick does not amount to the presently claimed invention. Moreover, because Sunkara discloses a process in which polymerization is to be avoided, there is no motivation to one skilled in the art to combine the process disclosed in Sunkara with the process disclosed in Kilpatrick, to arrive at a method for polymerizing 1,3-propanediol.

Claim 46 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Brill et al., U.S. Patent No. 3,192,184 (hereinafter "Brill"), in view of Lohe et al., U.S. Patent No. 5, 814,282 (hereinafter "Lohe"). Brill discloses a process that comprises flowing a liquid polymerizable material downwardly and by force of gravity over a substantially vertical surface (col. 1, lines 56-64). In contrast, present claim 46 recites an up-flow reactor, in which, as disclosed in the present specification at page 4, lines 7-10, reactants flow upward. Applicants further submit that the reactor disclosed in Brill is intended to overcome problems associated with the formation of polyesters, not with the formation of polyethers. Accordingly, Applicants submits that a person of ordinary skill in the art, considering polymerization of diols to form polyethers would not rely on the teachings of Brill. Lohe fails to cure the deficiencies in Brill with regard to any disclosure or suggestion of present claim 46. Lohe discloses an apparatus for polymerization that includes a means for wiping the walls of the apparatus, to facilitate volatilization of volatile components. Applicants further submit that there is no motivation provided in Brill or Lohe for a person of ordinary skill in the art to combine the two references, since Lohe does not disclose polymerization in a reactor having two or more stages. Accordingly, Applicants submit that claim 46 is neither disclosed nor suggested by Brill in combination with Lohe.

CONCLUSION

In view of the present amendments and the above remarks, Applicants respectfully submit that all of claims 1, 20-24 and 46-95 are patentable over the cited references and in condition for allowance. Accordingly, prompt favorable action is earnestly requested.

The Commissioner is hereby authorized to charge any fee deficiency or credit any additional charges to Deposit Account No. 04-1928 (E.I. du Pont de Nemours and Company).

Respectfully submitted,

Date: 11/10/04

By: Gail Ann Dalickas
Gail Ann Dalickas
Reg. No. 40,979
Phone: (302) 984-6282
Fax: (302) 658-1192